Space Operations Management Office

STS-106 ISS 2A.2B Flight Readiness Review

Networks

Agenda

- STS-101 Anomalies
- Flight Activity
- TDRSS Constellation
- Significant Changes
- Configuration Management
- Critical Periods

Ted Sobchak
Network Director
GSFC/Code 450
August 2000

STS-101 Anomalies

- **Pre-Launch Support**
  - **Experienced intermittent command drops from JSC during the STS-101 TCDT on April 7**
  - **Two unrelated problems were the cause**
    - **Prime Command Path via Terrestrial Circuit isolated to the carrier**
      - **Carrier reluctant to perform repair work outside of planned maintenance hours, prolonged the outage during TCDT activities**
      - **Corrective Action: Reinforcement of processes for notification to carriers and escalation of outage restoral; carrier soft failure reroute tested.**
    - **Redundant Command Path Circuit issue isolated to KSC internal switching system**
      - **Caused by low signal levels due to misconfigured switch setting**
      - **Corrective Action: Configuration Procedures reviewed and an alternate path through KSC has been identified**

STS-101 Anomalies (con't)

- **Launch Countdown**
  - **Second Launch Attempt (March 2000)**
    - **PDL data lost at T -55 minutes when a PDL bit sync failed to relock on MIL data after switching to high power**
      - **Procedures modified to include an operator check of the bit sync status following the switch to high power**
    - **WLPS test data was erroneously identified with MIL source code causing loss of MIL data at JSC and SKR data to KSC**
      - **MIL setup procedures modified to default WLPS data with the PDL source code**
  - **Third Launch Attempt (March 2000)**
    - **MIL DQM subsystem software crashed several times effecting Best Source Select (BSS) switching**
      - **Software fix identified and delivered**

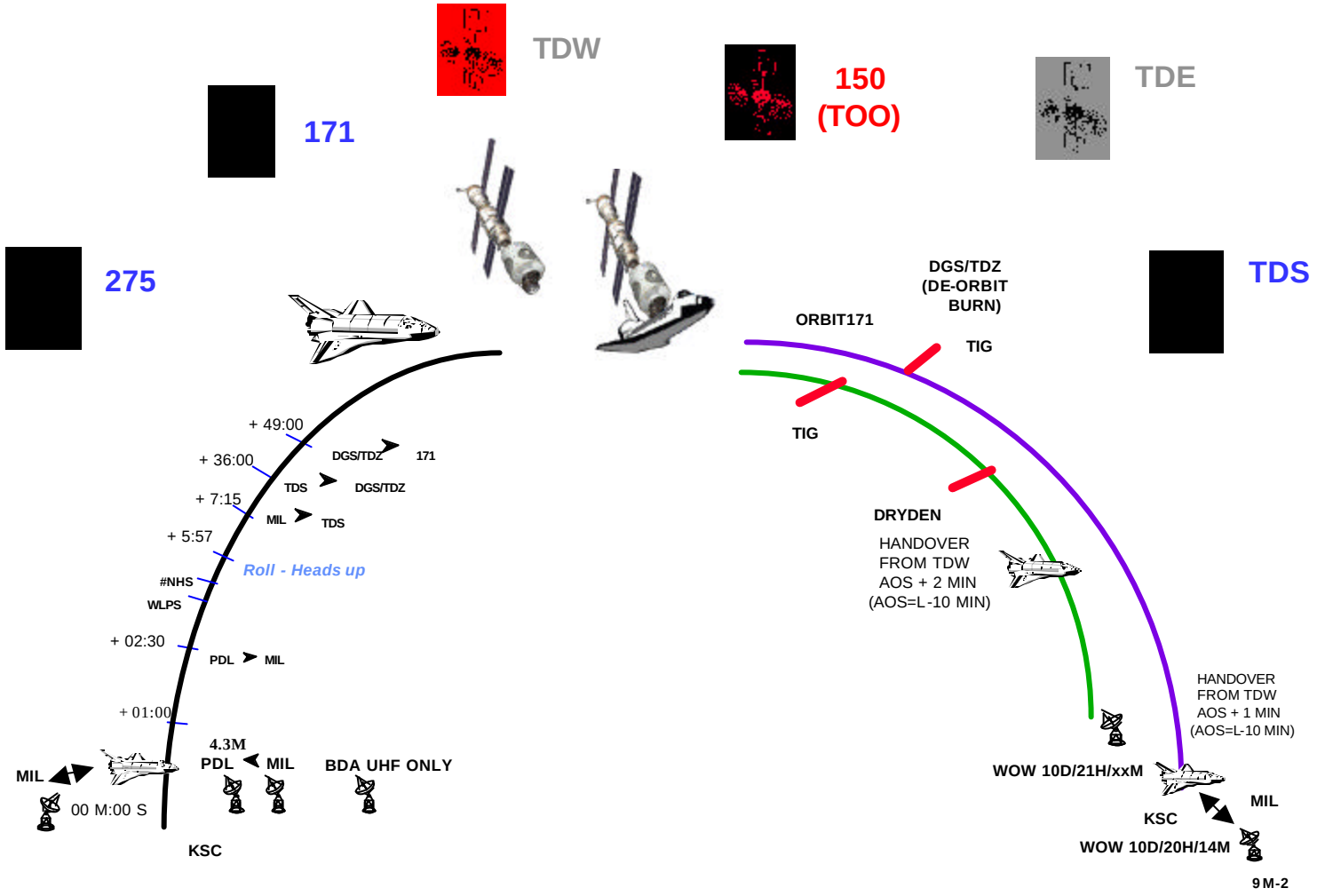
STS-101 Anomalies (con't)

- **L-1 Day Checks**
  - **MIL receiver did not automatically switch from TDRS to STDN mode when Shuttle switched**
    - **Known software discrepancy**
      - **Corrective workaround not properly documented**
    - **Software corrected to prevent future occurrence**

ISS Support Anomaly

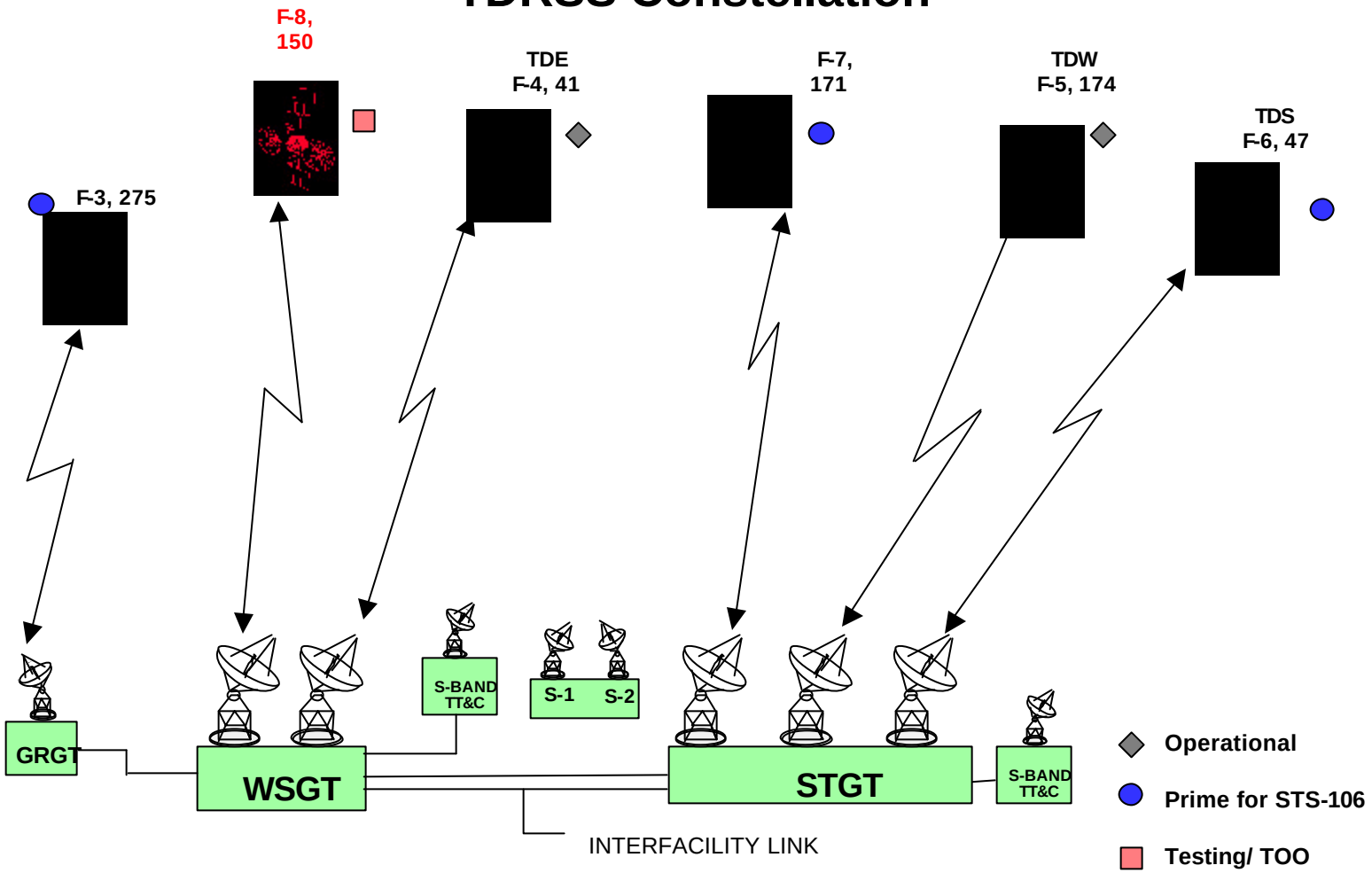
- **Corrupted TDRS acquisition data caused by improperly configured powered flight profile for another user (July 31)**
- **Corrective Action: A prime and backup acquisition data generation system will be dedicated to support ISS and Shuttle**

STS-106 FRR
Mission Services



STS-106 FRR
Mission Services

TDRSS Constellation



Significant Changes (Space Network)

TDRS-H (F-8)

- Launched June 30, 2000 on an Atlas IIA
- Spacecraft at 150^{0}W (July 15, 2000)
  - Acceptance and Post-Acceptance testing at 150^{0}W through late September to include verification with JSC/ESTL on August 28
  - F-8 will be co-located with the F-7 spacecraft at 171^{0}W and used for ISS and Shuttle early 2001
  - Target of Opportunity (TOO) passes may be scheduled during crew sleep periods

WSC Modifications

- Software release 00003A scheduled for completion on August 30
  - Formalizes ETNs already in the systems at WSC

Virtual Spacecraft

- TOO passes will be scheduled to verify GCMR capabilities for both ISS and Shuttle

Significant Changes (DSMC)

- The Data Systems Management Center (DSMC) consolidates GN and SN near term mission planning, real-time console operations, scheduling, service accounting, and test functions at WSC
- Implemented through a series of physical relocations, system enhancements, and personnel movements which will enable functional and organizational consolidations
- Scheduled to be complete in September 2002
- The services provided to SN and GN customers do not change
  - There are no significant systems changes
- Major Activities :
  - Realtime Ops interface functions will transfer after “GO” for on orbit operations from NCC Ops to WSC Ops

Significant Changes (NISN)

- **Small Conversion Device (SCD) 5.0 Transition**
  - The SCD 5.0 software was delivered to network IP conversion devices. As a result of this delivery, software maintenance will be transferred from the PTP vendor to NASA control
  - JSC
    - Supported STS-99 launch count and GN L-1 day checks in a shadow mode to validate new software. Remaining devices upgrade to upgraded to SCD 5.0 on June 21.
  - MSFC
    - Supported STS-103 and 99 running SCD 5.0 in shadow with no problems. Final delivery on June 21.
  - KSC
    - CD&SC has installed software and will use for TCDT August 18-19
  - GSFC, WPS, DFRC installations completed August 4.
- **All sites plan to support the mission utilizing SCD 5.0 software**

Significant Changes (NISN)

Russian Circuit Transition

- Planned configuration
  - Terminate circuits from Russia directly into JSC
- Advantages of new configuration
  - Automated failover and eliminates network complexity
- Key Milestones

– Design Review	July 24, 2000
– Circuit Turnover	August 31, 2000
– Remove GSFC Connections and Equipment	October 3, 2000
– Replace Equipment at MCC-M (Complete)	October 26, 2000

JSC MDM

- Modified firmware in JSC backup MDM will be tested on orbit for 960/1024 kbps lock times

Significant Changes (Ground Network)

- **MIL**
  - **Mission Support Staffing**
    - **Contract negotiations are ongoing with GHG**
    - **Supplemental staffing plan is under development to cover all staffing requirements**
  - **MBR**
    - **Software delivery to correct some open discrepancy items**
      - **Installed, tested, and will be verified**
- **DFRC, WPS, WSC (VHF)**
  - **Ready to support SM VHF-1 voice checks if scheduled**
  - **Links identical to ISS Phase 1 MIR support**

Significant Changes (AFSCN/DFRC)

- **Air Force RTS**
  - Will use TCS-B
    - TSC-A undergoing upgrades
  - VTS A and B have been upgraded to a Digital Recording System (Archival)
  - AFSCN Internal Comm Network is being upgraded to a 5 Mbps, ATM system
    - CTS interface operational
- **Dryden Flight Research Center**
    - Direct signal test inject capability installed for Telemetry and TV testing.
    - New Metrum (digital) recorders are under test and planned for support
      - Old recorders will be available as a back-up

Configuration Management

- **Mission Freeze**
  - **An Integrated Networks freeze is planned for August 31**
  - **Exemptions must be approved prior to implementation.**
- **Critical Period Restrictions**
  - **Critical periods will be identified prior to the mission and documented in a "Mission Critical Periods ISI"**
  - **Maintenance and testing restrictions are imposed for all Network elements during mission critical periods.**

Generic Shuttle/Station Critical Periods

EVENT	START	STOP
LAUNCH RENDEZVOUS MISSION	LAUNCH -4 HOURS	LAST RENDEZVOUS BURN ON FD1
LAUNCH NON-RENDEZVOUS MISSION	LAUNCH -4 HOURS	"GO FOR ORBIT OPS"
PAYLOAD DEPLOY	DEPLOY -3 HOURS	FINAL SEP BURN (+1 ORBIT DELAY)
RENDEZVOUS/DOCKING	2 HOURS PRIOR TO FIRST DAY OF RENDEZVOUS BURN (~CREW WAKEUP)	HATCH OPENING (+1 ORBIT DELAY FOR CONTINGENCY)
RENDEZVOUS GRAPPLE/RETRIEVE	2 HOURS PRIOR TO FIRST DAY OF RENDEZVOUS BURN (~CREW WAKEUP)	PAYLOAD BERTHING (+1 ORBIT DELAY FOR CONTINGENCY)
EVA	EVA EGRESS - 1 HOUR	EVA INGRESS + 1 HOUR
SELECTED ASSEMBLY/ ACTIVATION/CHECK-OUT TASKS	1 HOUR PRIOR TO START OF IDENTIFIED PERIOD SPECIFIED IN MISSION FLIGHT RULE ANNEX	+1 HOUR FROM TERMINATION OF IDENTIFIED PERIOD SPECIFIED IN MISSION FLIGHT RULE ANNEX
REBOOST OPS	3 HOURS PRIOR TO MANEUVER TO REBOOST ATTITUDE	150 MINUTES AFTER RETURN TO NOMINAL ATTITUDE
UNDOCKING	UNDOCKING - 3 HOURS	FINAL SEP BURN (+1 ORBIT DELAY)
LANDING	TD - 5 HOURS	WOW

IDENTIFIES CRITICAL PERIODS

Space Operations Management Office

Certificate Of Flight Projects Directorate Networks Readiness

This is to certify that with successful completion of flight readiness preparations and closure of associated action items, all integrated networks and CSOC elements are ready to support the STS-106/2A.2B - Spacehab

William F. Mack 8/4/00
W. Mack/NASA **Date**
Office of Flight Assurance

T. Sobchak 8/4/00
T. Sobchak/NASA **Date**
Space Shuttle Network Director

Jon F Walker 8/4/00
J. Walker/NASA **Date**
Center Customer Commitment Manager

Quinton Norman 8/4/00
S. Norman/NASA **Date**
NISN Representative

D. Wagner 8/4/00
D. Wagner/HTSI **Date**
GSFC CSOC Site Manager

for J. McKee 8/4/00
J. McKee/DRFC **Date**
Center Mission Services Manager

Goddard Space Flight Center

Certificate of Space Operations Management Office Readiness

Pending completion of flight readiness preparations, remaining standard work and closure of all action items, SOMO dedicated elements and all CSOC resources are ready to support the STS-106 Mission.

_____

S. C. Newberry **Date**
Director, Space Operations Management Office
Johnson Space Center

_____

Ted Sobchak/NASA **Date**
Space Shuttle
Network Director

_____

D. Tighe **Date**
CSOC Program Manager